

On the Status of *Euphydryas editha baroni* with a Range Extension of *E. editha luestherae*

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Abstract. The subspecies name *baroni* has been misapplied to include all Coast Range populations of *Euphydryas editha* found north of the San Francisco Bay area. However, the original description and correspondence between the original collector, Baron, and the author of the species, Edwards, indicate that *baroni* should be restricted to a very few populations on the immediate coast of Mendocino County, California. It is suggested the subspecies name *luestherae* be applied to populations traditionally lumped with true *baroni* that inhabit Inner Coast Range chaparral.

Introduction

More than a decade ago study of *Euphydryas editha* was extended from the well-known populations on Jasper Ridge (Ehrlich, 1965) in the Outer Coast Range of California to other locations where populations of different subspecies are found (Gilbert and Singer, 1973). Findings were in line with the view of Ehrlich and Raven (1969) that most species are neither ecological or evolutionary units. *Euphydryas editha* is made up of a number of ecotypes, groups of ecologically similar populations (White and Singer, 1974), which show similar allele frequencies at at least some gene loci (McKechnie et al., 1975; Murphy, Wilcox and Ehrlich, in prep.).

Within California, where local differentiation is greatest, ecotypes more or less match the named subspecies of *Euphydryas editha*. Coastal populations ovipositing on *Plantago erecta* are subspecies *bayensis*, Sierra foothill populations on *Collinsia tinctoria* are *rubicunda*, and so on. Some subspecies, as now applied, appear to be made up of several local host races in similar habitats—*monoensis* for instance includes populations ovipositing on *Collinsia* and *Plantago* in Ormsby County, Nevada and on *Castilleja* in Mono and Inyo counties in California.

To date *baroni* is the only subspecies name applied to *editha* from California north of San Francisco and west of the Central Valley. The vast majority of specimens originate from the inner Coast Ranges where *E. editha* flies in *Arctostaphylos*-dominated chaparral, ovipositing nearly exclusively on a hemiparasitic scroph, *Pedicularis densiflora*, and commonly nectaring on *Eriodictyon californica*. However, the California

Academy of Sciences recently acquired two specimens of *Euphydryas editha* from Pt. Arena, Mendocino County, California, collected on 9 June 1962 by Hardin B. Jones (see Fig. 1). The appearance of habitat surrounding Pt. Arena could not be more distinct from inland chaparral, and the extremely small, darkly marked individuals from there dramatically differ from Coast Range "baroni". Yet this is apparently not a new subspecies. It is my opinion that these two specimens are the "real" *baroni*, and that this name was never intended to refer to butterflies from chaparral areas.

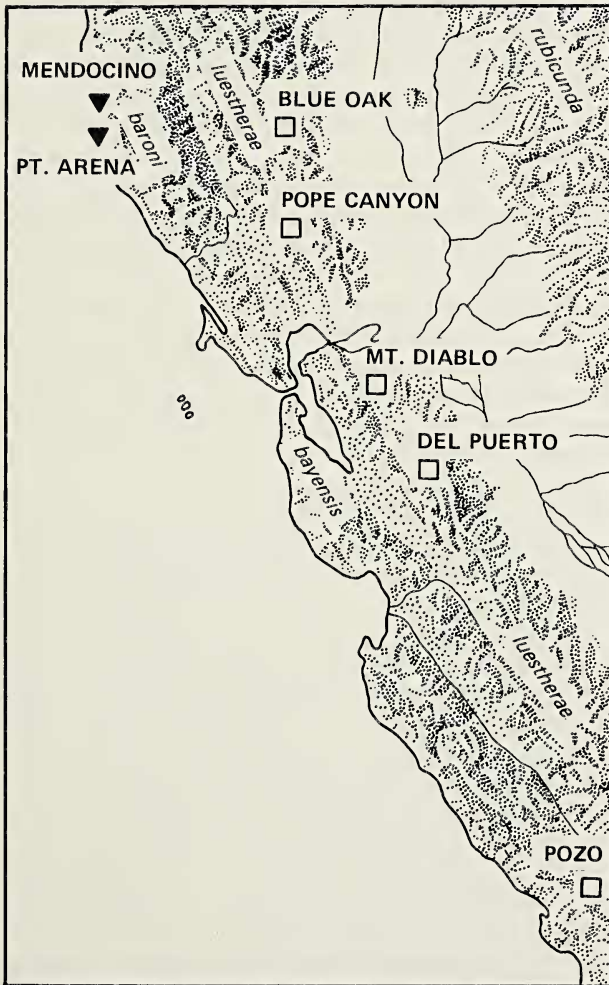


Fig. 1. Distribution of *Euphydryas editha* subspecies.

Documentation

During December, 1878, William H. Edwards received from Oscar T. Baron a box of hibernating checkerspot larvae which hatched from egg masses laid the previous June 29th (Edwards, 1879, 1897). Though these larvae did not survive the winter, Edwards described the early stages (Edwards, 1879). In May of 1879, Edwards received chrysalids of the same butterfly which Baron had reared from the same lot of larvae (Edwards, 1897). This is important in establishing the identity of *baroni* since F. M. Brown has assigned a lectotype for this subspecies from among adults emerged from those specific chrysalids. This designation was necessary to clear up a complex situation arising because Henry Edwards (1881) was the first to describe adequately the adult of *baroni*, and had been credited its authorship by many, including W. H. Edwards himself (see Brown, 1966 for details).

The type locality appears to have been assigned to Mendocino, California, on the strength of the postmark on the material shipped to W. H. Edwards. Yet Brown (1965) established that at the time the chrysalids were received by Edwards in West Virginia, May, 1879, Baron was well into a collecting trip east into the mountains of Mendocino and Lake Counties, where he also collected *Euphydryas editha*. However, preceding this journey Baron did not venture far, collecting locally where he worked in the town of Mendocino and nearby Navarro, both on the immediate coast (Brown, 1965). Combined with the knowledge that the 1879 adults were from larvae collected in 1878, a strong case is made for a coastal origin for *Euphydryas editha baroni*.

Additional information in W. H. Edwards' (1897) monograph indicates that Baron and Edwards considered *Euphydryas editha* from coastal and inland populations as distinct. They, in fact, discussed them as different species. Edwards (1897) quotes Baron ". . . I have the caterpillars of *rubicunda* and *baroni* side by side". . . and (*rubicunda*'s) "caterpillar is certainly distinct from that of *baroni* and feeds on different plants". Baron and Edwards use the name *rubicunda* mistakenly. They fail to distinguish Baron's inland Mendocino County populations of *editha*, from Eden Valley, Big River and near Ukiah, from the *rubicunda* of the Sierra Nevada foothills described by Henry Edwards (1881), which was then still rare in collections. Furthermore, the *Melitea rubicunda* illustrated by Edwards (1897) are Inner Coast Range *editha*, certainly not from the Sierra foothills, where dorsal wing surfaces are much redder. (The name *rubicunda* is controversial itself and may be a synonym for *E. editha editha* Boisduval, since the original collector of *editha*, Lorquin, did not venture as far south as the now-accepted type locality of *editha* [J. F. Emmel, pers. comm.].) Nonetheless, Baron and Edwards do not mix up coastal and inland *Euphydryas editha*; to them the inland butterflies were not *baroni*.

Recommendation

Though northern California chaparral populations of *Euphydryas editha* are not *baroni*, there is a name which can apply. Murphy and Ehrlich (1980) described *Euphydryas editha luestherae* from ecologically similar populations from the chaparral of the Inner Coast Range south of the Sacramento River Delta. They noted that Napa and Sonoma County individuals were "... phenetically intermediate to *baroni* (sic) and this new subspecies (*luestherae*).” Preliminary electrophoretic evidence (Wilcox, Ehrlich and Murphy, in prep) comparing 20 loci coding for structural genes indicates that the genetic distances between and an extremely southern *luestherae* population, Pozo, San Luis Obispo County, and a northern population, Blue Oak Campground, Lake County, are no greater than between samples taken in different years from the same populations at Pozo or at Pope Canyon, Napa County. In fact, present genetic distances are greater between Pozo and Del Puerto Canyon, Stanislaus County, both originally assigned to *luestherae*, than between Pozo and all other Inner Coast Range populations that have been sampled from north of San Francisco Bay.

The northern range limits of *Euphydryas editha luestherae* therefore should be extended from Mt. Diablo, Contra Costa County, to include populations in Napa, Sonoma, Lake, Mendocino, Colusa, Glenn and Tehama counties, in other words all Coast Range populations which use *Pedicularis densiflora* as their primary larval host plant. The subspecies *rubicunda* should refer to populations ovipositing on *Collinsia tinctoria* south from Mud Creek, Butte County (near Chico), through the Sierra Foothills to Fresno County at elevations of 400-1400 m.

Euphydryas editha baroni is now restricted to populations on the immediate coast of central Mendocino County south from the vicinity of the town of Mendocino. *E. editha* from the extreme north coast of that county are phenetically distinct from *baroni* and probably have an affinity with *Plantago lanceolata*-feeding populations of southern Oregon (White and Singer, 1974) which may be *taylori*. In any case, Oregon records are not *baroni* (see Dornfeld, 1980).

An additional pertinent note: Dos Passos (1964) and Miller and Brown (1981) list a "transitional form" or aberration of *baroni*, "*dunni*", credited to Gunder (1929). The holotype is in the American Museum of Natural History. Three labels in Gunder's handwriting below this specimen read—*Label 1*-Mendocino Co., Calif. 1912, (W. F. Eastman), received thru Mr. Norman R. Gunn. *Label 2*-described in the Pan-Pac. Entom., July, 1929-(gunni is misspelled [sic] in the orig. description). Holotype male, collection of Jeane D. Gunder. *Euphy. editha* Bdv., race *baroni* Edw., tr.f. *gunni*, J. D. Gunder. *Label 3*-J. D. Gunder collection, Ac 34998. It is impossible to ascertain from these locality data or from the individual's phenotype

whether *gunni* is actually an aberration of *baroni*, of *luestherae* or of yet some other subspecies.

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Literature Cited

- BROWN, F. M., 1965. Oscar Theodor Baron (1847-1926). *J. Lepid. Soc.* 19:35-46.
- , 1966. The types of the Nymphalid butterflies described by William Henry Edwards - Part II Melitaeinae. *Trans. Amer. Ent. Soc.* 92:357-468.
- DORNFELD, E. J., 1980. The butterflies of Oregon. Timber Press. Forest Grove, Oregon.
- DOS PASSO, C. F., 1964. A synonymic list of the nearctic Rhopalocera. *Lepidopterist's Society Memoir No. 1.*
- EDWARDS, H., 1881. Some apparently new forms of diurnal Lepidoptera. *Papilio* 1:50-55.
- , 1879. Notes upon the preparatory stages of certain species of butterflies. No. 1. *Canadian Ent.* 11:127-130.
- , 1897. North American butterflies. Houghton, Mifflin and Co. Boston.
- EHRlich, P. R., 1965. The population biology of the butterfly *Euphydryas editha* II. The structure of the Jasper Ridge Colony. *Evolution* 19:327-336.
- EHRlich, P. R. & P. RAVEN, 1969. Differentiation of populations. *Science* 165:1228-1232.
- GILBERT, L. E. & M. C. SINGER, 1973. Patterns of dispersal and gene flow in a butterfly species. *Amer. Natur.* 107:58-72.
- GUNDER, J. D., 1929. The genus *Euphydryas* Scud. of Boreal America (Lepidoptera Nymphalidae). *Pan-Pac. Entomol.* 6:1-8.
- McKECHNIE, S. W., P. R. EHRlich & R. R. WHILE, 1975. Population genetics of *Euphydryas* butterflies. I. Genetic variation and the neutrality hypothesis. *Genetics* 81: 571-594.
- MILLER, L. D. & F. M. BROWN, 1981. A catalogue/checklist of the butterflies of America north of Mexico. *Lepidopterist's Society Memoir No. 2.*
- MURPHY, D. D. & P. R. EHRlich, 1980. Two California checkerspot butterfly subspecies: one new, one on the verge of extinction. *J. Lepid. Soc.* 34:316-320.
- WHITE, R. R. & M. C. SINGER, 1974. Geographical distribution of host plant choice in *Euphydryas editha* (Nymphalidae). *J. Lepid. Soc.* 28:103-107.